

Preliminary assessment of socio-economic potential for rain water harvesting (RWH) in semi-arid Bobirwa Sub-district of eastern Botswana

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Abstract

This report is an account of an on-going study being carried out in Mathathane, Motlhabaneng and Tsetsebjwe villages of Bobirwa Sub-district in eastern Botswana to assess the socio-economic potential for RWH. Bobirwa Sub-district has a mean annual rainfall of 350 mm, and is composed of hardveld soils that are mostly loams to sandy clay loams. Participatory Rural Appraisal (PRA) workshops were conducted in March 2012 at the three villages. The PRA workshops identified a number of agricultural production constraints including low variable rainfall, pests, weeds, poor management and low prices. Possible RWH techniques were also identified including winter ploughing, ripping, double ploughing and inter-row cultivation. Five willing farmers were sampled from each village to participate in future socio-economic monitoring and RWH technology development.

Key words: Agricultural production constraints, Bobirwa Sub-district, Botswana, PRA, socio-economic potential for RWH

Résumé

Ce rapport est un compte rendu d'une étude en cours menée dans les villages de Mathathane, Motlhabaneng et Tsetsebjwe du sous-district de Bobirwa dans l'est du Botswana pour évaluer le potentiel socio-économique de la CEP. Le sous-district de Bobirwa a une pluviométrie moyenne annuelle de 350 mm et est composé de sols riches qui sont principalement des limons aux limons sablo-argileux. Les ateliers sur l'évaluation rurale participative ERP ont été menés en Mars 2012 dans les trois villages. Les ateliers ERP ont identifié un certain nombre de contraintes de production agricole, y compris la pluviométrie variable faible, les ravageurs, les mauvaises herbes, la mauvaise gestion et des bas prix. Les techniques de CEP possibles ont également été identifiées, notamment le labour d'hiver, la lacération, le labour double et les cultures réalisées entre les rangs. Cinq agriculteurs volontaires ont été échantillonnés dans

chaque village pour participer dans la future surveillance socio-économique et le développement de la technologie CEP.

Mots clés: Contraintes de production agricole, sous-district de Bobirwa, Botswana, ERP, potentiel socio-économique de la CEP

Background

Botswana has a semi-arid climate with average annual rainfall ranging from 250mm in the south-west to 650mm in the north-west. Furthermore, rainfall is seasonal, unreliable and varies from year to year (Government of Botswana, 2000). Water is often a limiting factor for cultivation of food crops. It is thus crucial that every effort be made to conserve and efficiently utilise the scarce rain water. Rain water harvesting (RWH) is one of the methods that can be used to manage the scarce rainfall in semi-arid areas in order to enhance agricultural production. RWH can be defined in various ways, however, a basic definition is that given by Myers (1975) as “any system that encompasses methods for collecting, concentrating and storing various forms of runoff for various purposes”. The focus of the present study is to assess the socio-economic potential for RWH in semi-arid areas of Bobirwa Sub-district.

Literature Summary

Adoption studies in Soil & Water Conservation (SWC) and RWH in Tanzania have shown that factors affecting SWC and RWH technology adoption include technical knowledge, farm size, labour and perception of technology (Senkondo *et al.* , 1998); secure land tenure (Kalineza *et al.* , 1999); number of farming plots and gender of household head (Senkondo *et al.* , 1999). The limited extent of knowledge in RWH by farmers was identified as the main constraint in one study (Senkondo *et al.* , 1999). Farmer participation in RWH technology development and testing plays a significant role in eventual adoption of the technology. Lazaro *et al.* (1999) reported that effective farmer participation required little external support for farmers to contribute substantially towards technology development and adoption.

Study Description

The first step in the assessment of socio-economic potential for RWH engaged PRA approaches to collect vital information in three representative villages of Bobirwa Sub-district (Chambers, 2005). Bobirwa Sub-district, with a mean annual rainfall of 350mm, is situated in the hardveld (in eastern Botswana) where soils are mostly loams to sandy clay loams. The representative villages are Mathathane, Motlhabaneng and Tsetsebjwe. Key PRA tools included group interviews, detailed discussions in

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selected farmers' fields, group discussions involving staff of institutions, transect group surveys, grey literature and evaluation.

The socio-economic features of the study area are shown in Tables 1 and 2.

The PRA workshops conducted at Mathathane, Motlhabaneng and Tsetsebjwe villages (Plates 1 and 2) identified a number of agricultural production constraints including low variable rainfall, pests, weeds, poor management and low prices (to sold produce). Possible RWH techniques were also identified and discussed including winter ploughing followed by a second ploughing, ripping furrows by moldboard, double ploughing and inter-row cultivation.

Table 1. Demographic and economic features of Mathathane, Motlhabaneng and Tsetsebjwe villages.

Name of village	Population	Household size (average)	Markets	Source of Income
Motlhabaneng	1600	10	Individuals or people from outside the village	Crafting, ploughing, sewing, working in lodges
Mathathane	3000	12	individuals	Crafting and ploughing
Tsetsebjwe	6000	7	Botswana Agriculture Marketing Board (Selibe-Phikwe)	Tuck-shops, shebeens, selling livestock and clothes

Table 2. Livestock statistics of Mathathane, Motlhabaneng and Tsetsebjwe villages.

Name of village	Goats	Sheep	Donkeys	Horses	Cattle	Total
Tsetsebjwe	10000	3500	13600	0	30000	57100.00
Mathathane/ Motlhabaneng	2000	8500	1500	5	7 200	12005.00

As to the emerging lessons of stakeholder engagement and impacts on agricultural development, forty farmers from the three villages (viz. Tsetsebjwe, Mathathane and Motlhabaneng) in Bobirwa Sub-district participated in PRA workshops through individual interviews and group discussions. They were sensitised on RWH technologies, but also shared their long perceived experience on rainfall variability in the area with the research team. Fifteen sampled farmers volunteered to



Plate 1. PRA workshop for Mathathane and Motlhabaneng farmers.



Plate 2. PRA workshop at Tsetsebjwe village

References

participate in future socio-economic monitoring and RWH technology field testing.

Chambers, R., 2005. *Ideas for Development*. Earthscan, London, UK. 259pp.

Government of Botswana, 2000. *Botswana National Atlas*. Government of Botswana, Gaborone.

- Kalineza, H.M.M., Mdoe, N.S.Y. and Mlozi, M.R.S. 1999. Factors influencing adoption of soil conservation technologies in Tanzania: A case study in Gairo. Paper presented at the Fourth Annual Scientific Conference of the Faculty of Agriculture, Sokoine University of Agriculture, Morogoro, November 17-19, 1999.
- Lazaro, E.A., Senkondo, E.M.M., Bakari, A., Kishebuka, S.R. and Kajiru, G.J. 1999. A small push goes a long way: Farmers' participation in rainwater harvesting technology development. *Tanzania J. Agric. Sc.* 2(2): 219-226.
- Myers, L.E. 1975. Water harvesting, 2000 B.C to 1974 A.D. In: G.W. Fraiser (Ed.), Proceedings of Water Harvesting Symposium, Phoenix Arizona, March 1974. USDA, Agriculture Research Service. pp 1-7.
- Senkondo, E.M.M., Mdoe, N.Y.S., Nuhu, H., Mahoo, H.F. and Gowing, J.W. 1998. Factors affecting the adoption of rainwater harvesting technologies in Western Pare Lowlands of Tanzania. *Tanzania J. Agric. Sc.* 1: 81-89.
- Senkondo, E.M.M., Lazaro, E.A. and Kajiru, G.J., 1999. Adoption of rainwater harvesting technologies by farmers in Tanzania with particular reference to the Western Pare Lowlands. *Tanzania J. Agric. Sc.* 2: 205-218.